

I am reading the Hemi-Sync Process and have an English question:

1) P6, 4th paragraph in "Hemispheric Synchronization", "Each hemisphere has its own olivary nucleus that receives signals from each ear." Does this mean that each olivary nucleus receives signals from both ears or the right nucleus receives signals from the right ear and the left nucleus from the left ear? From the context, I think the former is correct. But I would like to make sure if it is the case.

Quoting Oster, G. (1973). Auditory beats in the brain. In *Scientific American*, 229, pp. 94-102.

"Interaction of the signals from the two ears probably occurs at the brain center named the superior olivary nucleus. As the messages ascend the auditory pathways to be processed and interpreted at higher centers, this is the first center in the brain to receive signals from both ears. Actually there are two superior olivary nuclei; they are arrayed symmetrically on each side of the brain, and each is a terminus for nerve fibers from both ears." [emphasis added]

So you are correct in your interpretation, "... each olivary nucleus receives signals from both ears ...". But with respect to each ear, there are more nerve fibers connected to the opposing lateral olivary nucleus than to the similar-side olivary nucleus. See my next answer.

2) But if that is the case, does each olivary nucleus detect the phase difference, the frequency difference in this case? Does that mean the two nuclei are not functioning together?

A phase difference is detected between the olivary nuclei in the case of binaural beating (and within a single olivary nucleus in the case of monaural beating). With respect to each ear, there are more nerve fibers connected from each cochlear nucleus to the opposing lateral olivary nucleus than to the similar-side olivary nucleus. Because the nerve inputs differ, a phase difference between the olivary nuclei is preserved to some extent. Without this difference the localization of low-frequency sound with binaural hearing would not work.

So, in the case of Hemi-Sync, the olivary nuclei are said to be working together (detecting the phase difference) to enable the experience of binaural beating.

3) Each hemisphere functions independently from each other following its own olivary nucleus.

No, I don't think it's right to say this. Here is what I have said in the past:

"The sensation of auditory binaural beats occurs when two coherent sounds of nearly similar frequencies are presented one to each ear with

stereo headphones or speakers. The brain integrates the two signals, producing a sensation of a third sound called the binaural beat. Binaural beats originate in the brainstem's superior olivary nucleus, the site of contralateral integration of auditory input. This auditory sensation is neurologically conveyed to the reticular formation and simultaneously volume conducted to the cortex where it can be objectively measured as an EEG frequency-following response. The frequency-following response provides proof that the sensation of binaural beating has a neurological efficacy."

I don't think your statement; "Each hemisphere functions independently from each other following its own olivary nucleus." is valid.

As I state above, it is the reticular which alters the overall brainwave arousal state. The reticular formation of the brain stimulating the thalamus and cortex (referred to as the ERTAS) governs cortical brainwave patterns. The neurotransmitter acetylcholine, provided via cortico-thalamic projections, either inhibits or excites areas of the cortex by neutralizing or enhancing the effects of noradrenaline and serotonin coming to the cortex via "fountains" from the locus coeruleus and the raphe nuclei. There is no evidence that this mechanism is cortically hemispheric in the sense that with Hemi-Sync one could influence one cortical hemisphere over the other, e.g., "Each hemisphere functions independently from each other following its own olivary nucleus." In fact, this reticular mechanism is believed to be an ideal generalized system providing a neurochemical environment, a stimulus for both hemispheres that engenders coherent brainwaves and cortical hemispheric synchronization.

Then, under Hemi-Sync's influence, although the two hemispheres appear to work together, in reality, they do not. They happen to show the same brainwaves. But it is only because each olivary nucleus receives the same information. This is like the following situation: there are two groups of people each have their own leader. The both leaders received the same instructions. Each group follows each leader. So, the two groups do the same thing. It seems as if they are working together, but in reality they are not.

Am I right?

No, I think your logic is faulty here because it is based on false assumptions about the mechanism of action being based primarily on the olivary nuclei, which does not have the ability to alter brainwaves on its own, rather than the reticular.

If so, why do you claim in the catalogue "The result is a focused, whole-brain state known as hemispheric synchronization, or "Hemi-Sync" where the left and right hemispheres are working together in a state of coherence."?

Read over what I have said above and then let me try and clear this up a bit more, especially the part about the left and right hemispheres working together.

Over the years, much has been said about Hemi-Sync and hemispheric brainwave synchronization. Whenever there is talk of hemispheric synchronization, its purported benefits, or its uniqueness, we (at Monroe Products & TMI) lean forward a little bit and again hear the phonetics of the patented and trademarked expression Hemi-Sync.

Zealous advocates of Hemi-Sync (including me) have said that Hemi-Sync stimulated or otherwise encouraged brainwave synchronization between the cortical hemispheres. And it does in the manner that I have described above. For the last several years I have been gently trying to encourage the careful review of published literature, booklets, brochures, and advertising copy at both Monroe Products & TMI so as to explain to both the scientist and the layman what's going on here.

Bob Monroe himself never said that Hemi-Sync would synchronize your left and right brain hemispheres. (Below I quote his exact words taken from the tape *The Way of Hemi-Sync*.) So where does the name Hemi-Sync come from and what does it suggest?

Apparently, Bob came up with the name based on his understanding of binaural beats. In order to hear the beating, your right and left olivary nuclei (audio-processing centers in the two hemispheres of the brain) work together or in-sync with each other detecting the phase difference between the two audio inputs. This is true, as I have explained above. In Bob's words, "It [the binaural beat] is a pattern synthesized by the coordination of the right and left hemispheres of your brain. Hemi-Sync, or hemispheric synchronization." Note that in this statement Bob does not say that Hemi-Sync causes synchronization but only that the sensation of binaural beating is the result of coordination between the right and left hemispheres of your brain. Bob's use of the words "Right and left hemispheres" is a bit misleading though, because the unsophisticated reader assumes cortical hemispheres when, in fact, it is the coordination of the hemispheres of the olive and the two olivary nuclei in the brainstem, not the cerebral cortex that enables the sensation of binaural beating.

Having said this, remember that it is the reticular that alters the overall brainwave-arousal state through the mechanism of the neurotransmitters acetylcholine, noradrenaline, and serotonin. This system provides a neurochemical environment, a stimulus for both hemispheres to engender coherent brainwaves and cortical hemispheric synchronization.

That's why we claim in the catalogue, "The result is a focused, whole-brain state known as hemispheric synchronization, or 'Hemi-Sync' where the left and right hemispheres are working together in a state of coherence."